

U.S. Application No.: 10/525,939  
Amendment A

Attorney Docket No. 3875.041

**IN THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (currently amended) A substantially pure bulk chromium dioxide ( $\text{CrO}_2$ ) having saturation magnetization of at least 120 emu/gm.
2. (canceled)
3. (currently amended) The substantially pure bulk chromium dioxide according to claim 1 having saturation magnetization of 126 emu/gm ~~for sintered pellets~~ when synthesized in pellet form.
4. (currently amended) The substantially pure bulk chromium dioxide according to claim 1 having saturation magnetization of 132 to 135 emu/gm ~~for cold pressed form~~ when synthesized in powder form.
5. (currently amended) The substantially pure bulk chromium dioxide according to claim 1, which is in polycrystalline form.
6. (currently amended) The substantially pure bulk chromium dioxide according to claim 1 having negative magnetoresistance of at least 0.5% at about ~~near~~ room temperature at 2 Tesla.
7. (currently amended) The substantially pure bulk chromium dioxide according to claim 6 having negative magnetoresistance of at least 2% at about ~~near~~ room temperature at 2 Tesla.
8. (currently amended) The substantially pure bulk chromium dioxide according to claim 7 having negative magnetoresistance of about 5% at about ~~near~~ room temperature at 2 Tesla.

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9. (currently amended) ~~Bulk composites~~ Composites of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) having negative magnetoresistance of at least 0.5% ~~at about~~ near room temperature at 2 Tesla.
10. (currently amended) The bulk composites according to claim 9, having negative magnetoresistance of at least 2% ~~at about~~ near room temperature at 2 Tesla.
11. (currently amended) The bulk composites according to claim 10, having negative magnetoresistance of at least 5% ~~at about~~ near room temperature at 2 Tesla.
12. (currently amended) The bulk composites according to claim 11, having negative magnetoresistance of 8% ~~at about~~ near room temperature at 2 Tesla for a 25% molar  $\text{Cr}_2\text{O}_3$  composite, which is cold pressed.
13. (currently amended) The bulk composites according to claim 11, having negative magnetoresistance of 33% ~~at about~~ near room temperature at 2 Tesla for a 40% molar  $\text{Cr}_2\text{O}_3$  composite, which is sintered.
14. (currently amended) The bulk composites according to claim 9, having saturation magnetization of 75 emu/gm at 5K for a sintered 40% molar  $\text{Cr}_2\text{O}_3$  composite.
15. (currently amended) The bulk composites according to claim 9, having saturation magnetization of 103 emu/gm at 5K for a cold pressed composite of 25% molar  $\text{Cr}_2\text{O}_3$ .
16. (currently amended) ~~Bulk composites~~ Composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) having negative magnetoresistance of at least 0.5% ~~at about~~ near room temperature at 2 Tesla.

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17. (currently amended) The bulk composites according to claim 16, having negative magnetoresistance of at least 2% at about ~~near~~ room temperature at 2 Tesla.
18. (currently amended) The bulk composites according to claim 17, having negative magnetoresistance of at least 5% at about ~~near~~ room temperature at 2 Tesla.
19. (currently amended) The bulk composites according to claim 18, having negative magnetoresistance of about 8% at 2T at about ~~near~~ room temperature for a sintered composite with 80 emu/g  $M_s$ .
20. (currently amended) The bulk composites according to claim 18, having negative magnetoresistance of about 22% at 2T at about ~~near~~ room temperature for a sintered composite with 60 emu/g  $M_s$ .
21. (currently amended) The bulk composites according to claim 9, which can be obtained in cold and sintered powder form and in pellet form.
22. (currently amended) The bulk composites according to claim 9, which is homogenous.
23. (currently amended) The bulk composites according to claim 9, which is obtainable in any ratio of the constituent compounds.
24. (currently amended) The bulk composites according to claim 9, which has substantial reproducibility in sintered form.
25. (currently amended) A process for manufacture of substantially pure bulk chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or

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composites of chromium dioxide and  $\text{Cr}_2\text{O}_3$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) comprising heating an intermediate oxide, primarily  $\text{Cr}_8\text{O}_{21}$ , from about room temperature to a temperature of between 350 and 500°C for a period of between 1-5 hours whereby substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide or chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_3$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) are formed.

26. (previously presented) The process according to claim 25, wherein intermediate oxide is converted to said substantially pure chromium dioxide  $\text{CrO}_2$  when the temperature is maintained between 390-400°C or to a composite of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) when the temperature is maintained between 400-500°C or to a composite of chromium dioxide and  $\text{Cr}_2\text{O}_3$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) when the temperature is maintained between 350-390°C.
27. (currently amended) The process according to claim 25, wherein intermediate oxide, primarily  $\text{Cr}_8\text{O}_{21}$  used in the process of the invention is prepared by heating  $\text{CrO}_3$  and maintaining the temperature in the range of 230-320°C, ~~preferably in the range 250-280°C.~~
28. (currently amended) The process according to claim 25, wherein said  $\text{CrO}_3$  is heated and maintained in the said temperature range for 6-14 hours, ~~preferably 8-12 hours.~~
29. (previously presented) The process according to claim 28, wherein  $\text{CrO}_3$  is heated in dry oxygen/air.
30. (previously presented) The process according to claim 28, wherein  $\text{CrO}_3$  is heated at about atmospheric pressure.
31. (currently amended) The process according claim 28, wherein  $\text{CrO}_3$  is heated slowly to raise the temperature to about 250°C and then maintained in the said temperature range.

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32. (currently amended) The process according to claim 25, wherein intermediate oxide thus formed is cooled ~~slowly~~ to about room temperature preferably at the same rate as it was heated.
33. (currently amended) The process according to claim 25, wherein the intermediate oxide is crushed ~~[[in]]~~ into powder form prior to heating.
34. (currently amended) The process according to claim 33 ~~[[25]]~~, wherein, prior to heating, the said intermediate oxide in powder form is sealed in ~~[[a]]~~ an inert tube or can be pelletized ~~pelletized~~ and sintered before sealing in ~~a glass~~ an inert tube.
35. (currently amended) The process according to claim 25, wherein the temperature of intermediate oxide is maintained in the said temperature range between 350 and 500°C for 2-3 hrs.
36. (previously presented) The process according to claim 27, wherein in the composites of  $\text{CrO}_2/\text{Cr}_2\text{O}_3$  and  $\text{CrO}_2/\text{Cr}_2\text{O}_5$ , the mass fraction of  $\text{Cr}_2\text{O}_3$  or  $\text{Cr}_2\text{O}_5$  can be systematically varied by varying the temperature between 350 and 500°C.
37. (currently amended) A substantially pure bulk chromium dioxide ( $\text{CrO}_2$ ) manufactured by a process for manufacture of substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) comprising heating an intermediate oxide, primarily  $\text{Cr}_8\text{O}_{21}$  from about room temperature to a temperature of between 350 and 500°C for a period of between 1-5 hours whereby substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide or chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) are formed.

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38. (currently amended) Bulk composites ~~Gomposites~~ of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) manufactured by a process for manufacture of substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) comprising heating an intermediate oxide, primarily  $\text{Cr}_8\text{O}_{21}$  from about room temperature to a temperature of between 350 and 500°C for a period of between 1-5 hours whereby substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide or chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) are formed.
39. (currently amended) Bulk composites ~~Gomposites~~ of chromium dioxide and  $\text{CrO}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) manufactured by a process for manufacture of substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide and chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) comprising heating an intermediate oxide, primarily  $\text{Cr}_8\text{O}_{21}$  from about room temperature to a temperature of between 350 and 500°C for a period of between 1-5 hours whereby substantially pure chromium dioxide ( $\text{CrO}_2$ ), or composites of chromium dioxide or chromium sesquioxide ( $\text{CrO}_2/\text{Cr}_2\text{O}_3$ ) or composites of chromium dioxide and  $\text{Cr}_2\text{O}_5$  ( $\text{CrO}_2/\text{Cr}_2\text{O}_5$ ) are formed.
40. (currently amended) The bulk composites according to claim 16, which can be obtained in ~~cold and sintered powder form and in pellet~~ form.
41. (currently amended) The bulk composites according to claim 16, which is homogenous.
42. (currently amended) The bulk composites according to claim 16, which is obtainable in any ratio of the constituent compounds.

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43. (currently amended) The bulk composites according to claim 16, which has substantial reproducibility in sintered form.
44. (currently amended) The substantially pure bulk chromium dioxide according to claim 5 having negative magnetoresistance of at least 2% at about ~~near~~ room temperature at 2 Tesla.
45. (new) The process according to claim 25, wherein intermediate oxide, primarily  $\text{Cr}_8\text{O}_{21}$  used in the process of the invention is prepared by heating  $\text{CrO}_3$  and maintaining the temperature in the range of 250-280°C.
46. (new) The process according to claim 25, wherein said  $\text{CrO}_3$  is heated and maintained in the said temperature range for 8-12 hours.
47. (new) The substantially pure bulk chromium dioxide according to claim 1, wherein said bulk  $\text{CrO}_2$  comprises sintered pellets.

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